REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The present invention as set forth in **amended Claim 21** relates to a method, comprising:

reacting a polyol in an open mold with a polyisocyanate compound in the presence of a catalyst, a blowing agent and a foam stabilizer to form a flexible polyurethane foam,

wherein the polyol has a hydroxyl value of at most 15 mgKOH/g and the polyisocyanate compound is a **prepolymer-modified polymethylenepolyphenyl polyisocyanate.**

New Claim 40 relates to a method, comprising:

reacting a polyol in an open mold with a polyisocyanate compound in the presence of a catalyst, a blowing agent and a foam stabilizer to form a flexible polyurethane foam,

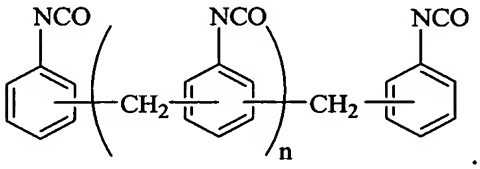
wherein the polyol has a hydroxyl value of at most 15 mgKOH/g and the polyisocyanate compound is a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound, which is different from the polyol.**

For better understanding of the invention, Applicants wish to provide an explanation of the production method of modified polymethylenepolyphenyl polyisocyanate used in the Examples of the present specification. However, this explanation should not be construed so as to limit the claims to what is described in the Examples or in this explanation.

The "polyisocyanate d3: MR200/MPG081 prepolymer (NCO=29.5 mass%)" described in the Examples (Table 1) of the present specification is an isocyanate compound obtained as mentioned below.

1a. Raw materials:

(1) MR200: polymethylenepolyphenyl polyisocyanate (crude-MDI) manufactured by Nippon Polyurethane Industry Co., Ltd.; isocyanate group (NCO: the molecular weight is set to be 42 for the calculation below) content: 31 mass%



In this formula, n is 0 or an integer of at least 1. Namely, the crude-MDI is a mixture made of a several types of polyisocyanate compounds. Generally, the composition thereof contains

from 40 to 50 mass% of a polyisocyanate compound of n = 0 (in this instance, this compound is diphenylmethane diisocyanate, the number of aromatic rings is 2);

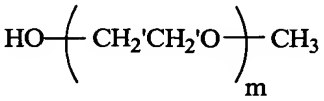
from 20 to 35 mass% of a polyisocyanate compound of n = 1 (in this instance, the number of aromatic rings is 3);

from 5 to 15 mass% of a polyisocyanate compound of n = 2 (in this instance, the number of aromatic rings is 4); and

from 10 to 20 mass% of a polyisocyanate compound of n = at least 3.

Namely, the average value of n is from about 0.5 to 1 (the average value of the number of aromatic rings is from 2.5 to 3). In this crude-MDI, plural methylene groups ($-CH_2-$), plural phenyl groups (aromatic rings) and plural isocyanate groups (-NCO) are present respectively, and it is therefore called "polymethylene polyphenyl polyisocyanate".

(2) MPG081: Polyethyleneglycol monomethylether manufactured by Nippon Nyukazai Co., Ltd. (Since the hydroxyl value (V_{OH}) is 84 mgKOH/g, its average molecular weight (M) is about 668 by calculation. Since the number of hydroxyl group is 1, the conversion is made by the formula $M = 56100/V_{OH}$).



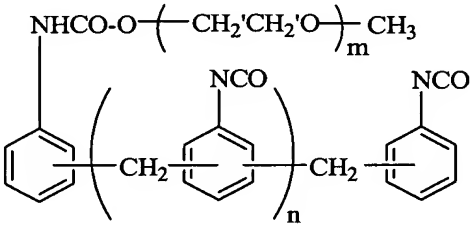
In this formula, the average value of m is about 14.5.

1b. Production method:

Into a 2 ℓ glass reaction vessel equipped with a stirrer, in a nitrogen atmosphere, 1,000 g of MR200 was charged. Here, since the isocyanate group content is 31 mass%, the isocyanate group is present in an amount of 310 g (7.38 mol). 36.1 g of (0.054 mol) of MPG-081 was dropwise added with stirring over 30 minutes.

Then, reaction was carried out at 70°C for 3 hours to obtain an isocyanate group terminal polyurethane prepolymer. The isocyanate group content of this isocyanate group terminal polyurethane prepolymer was 29.5 mass%. As is apparent from the fact that the reduction of the isocyanate group is small, the crude-MDI which was modified by the reaction was very small.

The structure of the crude-MDI which was modified by a prepolymer is shown below.



The reaction in this modification is a usual urethane reaction, and proceeds in accordance with the following general formula:

R-NCO + HO-R' → R-NHCOO-R'

As mentioned above, the modified crude-MDI indicated in the Examples of the present specification is the above crude-MDI composition in which a modified crude-MDI is contained in a small amount.

In contrast to the invention claimed in Claims 21 and 40, Takeyasu et al (US 5,093,380), EP-1,022,300 A1, and Ohkubo et al (US 5,777.175 (equivalent to CN '408 & EP '543)) fail to disclose or suggest the claimed combination of a reaction in an open mold of a polyol having a hydroxyl value of at most 15 mg/KOH and a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound, which is different from the polyol**, as claimed in Claims 21 and 40.

Takeyasu et al do not anticipate the presently-claimed invention. Takeyasu et al neither disclose nor suggest the use of an open mold. The only mold described in a closed mold, as shown in the examples. See, for example, column 8, line 15. Nor does Takeyasu et al require that their polyol have a hydroxyl value of at most 15 mgKOH/g, and that their polyisocyanate compound be a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound**. While Takeyasu et al lists exemplary polyols that have a hydroxyl value less than 15 mgKOH/g, i.e., polyols B, C, E and F, and while modified products of crude MDI are listed as applicable (col. 5, lines 44-46), none of the examples of Takeyasu et al disclose or suggest the claimed combination of a reaction in an open mold of a polyol having a hydroxyl value of at most 15 mg/KOH and a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound**, as claimed in Claims 21 and 40, respectively.

Thus, Takeyasu et al does not anticipate the presently-claimed invention.

EP-1,022,300 A1 EP 1,022,300 (Sugiyama et al) discloses, *inter alia*, a polyurethane foam produced by using a particular polyether polyol having a hydroxyl number of from 5 to 38 mgKOH/g and a polyisocyanate such as diphenylmethane diisocyanate (MDI),

polymethylene polyphenyl isocyanate (popular name: crude MDI), or its prepolymer type modified product [0077]. Sugiyama et al further discloses that molding is carried out preferably by a method of directly injecting a reactive mixture into a **closed mold** by using a low-pressure foaming machine or high-pressure foaming machine, or by a method of spreading a reactive mixture into a mold in an open state [0083]. All of the polyols exemplified by Sugiyama et al have a hydroxyl number higher than the presently-recited maximum of 15 mgKOH/g, as shown in Table 2 at page 15 thereof. None of the exemplified polyisocyanates is a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound**, as claimed in Claims 21 and 40. See Table 3 bridging pages 15 and 16 thereof. In addition, in all the examples showing the production of a flexible polyurethane foam, a closed mold was used [0140]. Thus, Sugiyama et al does not anticipate the presently-claimed invention.

Ohkubo et al disclose the production of a flexible polyurethane foam by using a polyol of which the monol content as the by-product at the time of production of a polyol is small. In the claims of this reference, a polyol of a relatively high molecular weight of from 10 to 35 mgKOH/g is used. However, the polyol of Example No. 22 in Table 7 shows the lowest hydroxyl value of 15.3 mgKOH/g which is more than the claimed " at most 15 mg/KOH".

Further, Ohkubo et al provide a high impact resilient molded foam while the present invention provides a low impact resilient foam. See column 11, lines 5 to 15 (particularly lines 10 to 11), and Examples (column 22, line 45 et seq), and Table 9. Namely, the impact resiliency is 74% in Example 23 and 76% in Example 24, of the reference. On the other hand, in the present invention, the highest impact resistance in the Examples is 50% in

Example 6. Further, when the core density is a relatively low (at most 50 kg/m^3), the impact resilience is as low as at most 40%.

The cited reference (i) is silent about the use of a polyol of at most 15 mgKOH/g as claimed, particularly less than 10 mgKOH/g; (ii) gives no disclosure about the foam stabilizer to be used; and (iii) discloses nothing about a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound**.

Further, the cited reference neither discloses nor suggests a method of making an urethane foam having all of the features obtainable by the present invention i.e. (a) a relatively low density, (b) an excellent durability, (c) a low temperature dependency, and (d) a low impact resilience.

Therefore, the rejections over Takeyasu et al (US 5,093,380), EP-1,022,300 A1, and Ohkubo et al (US 5,777.175 (equivalent to CN '408 & EP '543)) are believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of these rejections is respectfully requested.

The rejections of Claims 21, 22 and 24-39 under 35 U.S.C. § 112, 1st and 2nd paragraphs, is obviated by the amendment of Claim 21.

The double patenting rejections over the claims of U.S. 6,734,219 and U.S. 6,653,362 are traversed. The claims of the parent patent, U.S. 6,734,219, do not render the presently-claimed invention obvious, because one skilled in the art could not have predicted from the patent claims the significance of using the presently-claimed **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound** as the polyisocyanate compound and the superior results obtained thereby.

The claims of U.S. 6,653,362 are drawn to a process for producing a flexible polyurethane foam which comprises reacting a particular polyoxyalkylene polyol and a particular polyisocyanate compound in the presence of a catalyst and a blowing agent to produce a flexible polyurethane foam having a resonance frequency of at most 3.7 hz, a resonance ratio of at most 3.5 and an impact resilience of at most 7%. The claims of U.S. 6,653,362 do not require that their polyol have a hydroxyl value of at most 15 mgKOH/g, and more significantly, the only requirement of the polyisocyanate compound therein is that it contain from 0 to 50 mass% in total of a diphenylmethane diisocyanate and/or a polymethylene polyphenyl isocyanate. There is no disclosure or suggestion in the claims of U.S. 6,653,362 to use a **prepolymer-modified polymethylenepolyphenyl polyisocyanate** or a **prepolymer polymethylenepolyphenyl polyisocyanate modified with a hydroxyl group containing compound,** as the polyisocyanate compound therein, or that the use of such a polyisocyanate compound produces superior results, as discussed above.

Accordingly, it is respectfully requested that these rejections be withdrawn.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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